REMARKS

Claim 21 which was submitted in our April 18, 2002 response to the first office action, requested that a new claim 21, be added. The Examiner found that claim 21, which is drawn to a composition is in class 75, subclass 319, is a different subclass than claims 1 - 20 which is drawn to a process. Claims 1- 20 are in class 75, subclass 751. Claim 21 has been canceled in the current amendment.

Independent claim 1 has been amended to read on a process for forming metallized iron from a green briquette, having a water content of 0% to 5%. Support for the amendment comes from page 10, lines 3 - 9 of the specification. The specification states "Water added to the mixture within the range of 0% to 5% by weight of the mixture aids in the binding process, resulting in a stronger agglomerate. For situations in which the green mixture contains high water content, between 3% and 5% by weight, the mechanical action from the briquetting operation typically results in a 0 - 2% by weight reduction in overall moisture content due to the physical compression of the agglomerate material and the literal squeezing out of water. In the case of briquettes, no drying of the green briquettes is required and the briquettes can be directly charged to the heating furnace". Forming a green briquette enables the indurant process (drying) to be skipped prior to charging the furnace. The prior art does not teach these low levels of water, nor the ability to eliminate pre-drying. Claim 1 is further amended deleting the phrase "in a dry form", therein addressing the Examiner's 112 second paragraph objection in the Final Office Action.

Claims 2 & 3 are amended to read on green briquettes instead of agglomerates to be internally consistent with the antecedent wording of claim 1.

Claim 6 is amended deleting the phrase "cellulose fibers". The basis for the amendment is on page 9 lines 13 -15 of the specification, which states, "Finally, reductant materials are added to the mixture, the preferred reductant materials being coke breeze, petroleum coke fines, CDQ (cold dust quench) fines, and most preferably pulverized coal. Any other reductant commonly used in the direct reduction of iron is also acceptable, including charcoal or graphite". While the potential use of cellulose fiber exists as a reductant in agglomerates, in that it is comprised of carbon as noted in the specification on page 9, lines 18 - 20, it is not described for use with green briquettes.

Claims 7 & 8 are amended to read on green briquettes instead of agglomerate to be internally consistent with the antecedent wording of claim 1.

Claim 9 is amended to define the quantity of reductant that is present in a green briquette. In the specification on page 6, lines 2 and 3, states "A reducing agent, preferably pulverized coal, is added if needed for proper reduction of the agglomerate".

Claim 11 is amended to read on green briquettes instead of agglomerate, consistent with the antecedent wording of claim 1.

Claim 12 is amended to read on green briquettes instead of agglomerate, and in

accordance with the weight ranges for the binder as described on page 11, lines 15 -16 of the specification.

Claim 13 is amended to read on metallized briquettes instead of agglomerate, consistent with the antecedent wording of claim 1.

Claim 14 is amended to addressing the Examiner's 112 second paragraph objection in the Final Office Action that the percent water basis is unclear, and to define the criteria by which high compaction pressure compaction is determined. The basis for the amendment is page 10, lines 3 - 9 of the specification. The specification states "Water added to the mixture within the range of 0% to 5% by weight of the mixture aids in the binding process, resulting in a stronger agglomerate. For situations in which the green mixture contains high water content, between 3% and 5% by weight, the mechanical action from the briquetting operation typically results in a 0 - 2% by weight reduction in overall moisture content due to the physical compression of the agglomerate material and the literal squeezing out of water". The basis for the term "strong" in claim 14 is relative to conventional binders such as molasses / lime. A comparison of the cellulose binder and the molasses / lime binder is given on page 12, lines 18 - 20 of the specification.

Claim 17 is amended to read on green briquettes instead of agglomerates, which is internally consistent with the antecedent wording of claim 14.

Claim 18 is amended to delete "feed", which did not have proper antecedent basis.

Claim 19 is amended to read on green briquettes instead of agglomerate, and in accordance with the weight ranges for the binder as described on page 11 lines 15 - 16 of the specification.

Claim 21 is canceled.

In the Final Office Action dated July 30, 2002, the Examiner rejected claims 1-20 under U.S.C. 103(a) as being unpatentable over Avotins et al. (US 5,464,465). Avotins'465 discloses a process producing agglomerates comprising iron ore, paper fiber and coke breeze (col. 6, lines 7 - 11).

Applicant was unable to find the reference to coke breeze in col. 6, lines 7 - 11, however, did find a reference to coke breeze in claim 11. Claim 11 of Avotins reads in part "a product according to claim 1 wherein said fibers comprise primarily acrylic fibers, and the balance of the fibers are selected from the group consisting of paper fibers, rock wool fibers, peat moss, starch, dextrin, coke breeze, and a mixture of any of the foregoing". Avotins in claim 11 is disclosing coke breeze as a fiber, which will be used in combination with a polymer containing acrylonitrile as claimed in claim 1. Applicant's invention is distinguished from Avotins in that applicant's invention does not claim acrylonitrile in combination with acrylic fibers, nor does applicant claim the fibers selected from the group consisting of: " paper fibers, rock wool fibers, peat moss, starch, dextrin, coke breeze, and a mixture of any of the foregoing" in combination with acrylonitrile or acrylic fibers.

Avotins does not teach the utility of combining a reductant with iron oxide, along with a binder and with a small amount of water for the purposes of in situ metallization. Applicant has amended claims 1 and 14 such that the claims disclose a process for combining iron bearing materials, a reductant, a cellulose fiber and compressing these materials using briquetting equipment. The total water content of the briquette is 0%- 5% by weight of the briquette. Avotins teaches combining the components as an aqueous dispersion (col 2, line 49), in contrast, applicant's invention calls for a water content of 0% to 5%, which is not nearly enough water to form a dispersion. Avotins does not teach that a green briquette can be formed without the addition of an acrylonitrile based polymeric fiber, where the resulting briquette has excellent green crush strength and metallized crush strength. From viewing Figure 2 it is apparent that crush strength at 0 minutes (of the green briquette) is as high (~125 Kg) or higher than molasses based binders, and the crush strength remains high (~275 to 200 Kg) at the completion of metallization, which is normally between 6 - 10 minutes.

The Examiner has stated that applicants have admitted that cellulose fibers are equivalent to paper fibers in the Markush expression in claim 16.

Applicant does admit that there are many cellulose fiber sources that are suitable, however, the invention is a "METHOD OF A PRODUCING METALLIZED BRIQUETTE", as stated in the title, and not merely a *process for forming a briquette* or the *use of cellulose fibers as a binder*. The applicants' invention clearly deviates from Avotins and the other prior art in several aspects. As discussed in the previous paragraph, applicant is concerned with the crush strength of the metallized briquette as well as the crush strength of the green briquette. The crush

strength of the invention is graphically compared to other binders in Figure 2 of the specification. The prior art does not teach that crush strength can be affected by the choice of binders. Figure 5 shows that the average crush strength of various cellulose fibers is higher than conventional molasses based binders. Molasses are similar in composition to dextrin and starch claimed by Avotins. Figure 2 also shows that following metallization the crush strength for the briquettes is still higher than conventional binders. The briquette, following metallization in a DRI furnace, to iron has to be conveyed either to a collection bin or to a finishing furnace, such as an EAF furnace. During the process of transferring the metallized briquettes, the briquette must maintain its physical integrity, and not break apart. Avotins does not disclose the crush strength of a metallized briquette, and the conveying processes after metallization are not taught nor anticipated. Another differentiation, is that the instant invention describes a process for forming a metallized briquette, where a metallized briquette substantially contains (in situ) all the components/reductants necessary to convert the iron oxide to iron. As indicated in the attached Affidavit submitted by co-inventor James M. McClelland, unexpectedly, the presence of reductant enhances the performance of various cellulosic fibers. This enhancement is not disclosed by Avotins and other prior art reference.

An additional feature of the invention is that the green briquette formed is compacted using a briquetting process, wherein the resulting briquette has less than 5% water. This low moisture content prevents fracture of the briquette when it is introduced into the 1,000+ °C DRI furnace without induration/pre-drying.

Crowe, US 2,865,731, discloses an iron ore briquette containing paper pulp binder.

Crowe's briquette contains a much higher percent of moisture, on the order of 14.8%, and his briquette requires pre-drying prior to charging an iron making furnace. Crowe does not teach the utility of utilizing a reductant in combination with a cellulosic fiber. The pressures discloses by Crowe in col. 2, line 51 are low compared to a briquetting processes. A briquette is typically formed under pressures in the range of 8,000 to 12,000 psi or higher, and using the components disclosed in the invention, water is expressed until the water content of the briquette reaches a weight of 5% or less.

The claims have been amended to clearly point out the inventive process of making a green briquette, which in a DRI furnace is converted into a metallized briquette; where the metallized briquette has a high crush strength and a relatively high percent of metallized iron. The briquette remains substantially intact throughout the metallization process.

Since the amendment to the claims adds no more claims than previously paid for, no additional fees are required for the claims.

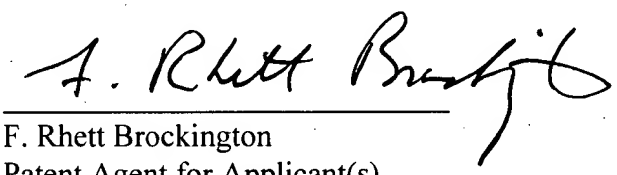
Also attached is James McClelland's Affidavit.

A petition for 1 month extension of time and the request for continued examination fees are enclosed.

In view of the foregoing Amendment and these Remarks, this Application is now believed to be in condition for allowance and such favorable action is respectfully requested on behalf of Applicant(s).

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned **"Version With Markings to Show Changes Made"**.

Respectfully submitted,



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Docket 2950RCE

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Specification:

Paragraph beginning at line 15 of page 9 has been amended as follows:

--- Finally, reductant materials are added to the mixture, the preferred reductant materials being coke breeze, petroleum coke fines, CDQ (cold dust quench) fines, and most preferably pulverized coal. Any other reductant commonly used in the direct reduction of iron is also acceptable, including charcoal or graphite~~;~~. The amount of reductant required depends upon the relative amount of iron components within the mixture as well as the amount of cellulose binder utilized. It has been found that cellulose fiber material can effectively act as a reductant and in some circumstances can replace some or all of the more costly beneficiated reductants. Thus, the potential exists for the reductant component in the agglomerate to be 100% replaced by cellulose material, especially if there is an economic advantage to doing so. Although various sizes of reductant material result in an acceptably strong agglomerate, reductant is preferably pulverized coal, with 80% of the coal able to pass 200 mesh screening.--

In the Claims:

Claims 1 - 3 have been amended as follows:

1. (Amended) A process for making metallized iron by reduction of ~~an~~ iron oxide ~~containing agglomerate~~ from green briquettes, said process comprising:

combining ~~in a dry form~~ iron bearing materials forming a mixture that is substantially

iron oxide, a reductant, ~~and~~ cellulose fiber and ~~with~~ 0% - 5% ~~up to 15%~~ water by weight of the ~~to form a~~ mixture;

compacting the mixture into green briquettes ~~the agglomerate~~; and

heating the green briquettes ~~agglomerate~~ at a temperature of from about 1000°C to about 1550°C for a period of 6 to 20 minutes, therein metallizing iron forming metallized briquettes.

2. (Amended) The process of claim 1, wherein said green briquettes ~~agglomerate is~~ are heated for a period of 7 to 9 minutes.

3. (Amended) The process of claim 1, wherein said green briquettes ~~agglomerate is~~ are heated at a temperature in the range of from 1000°C to 1300°C.

Claims 6 - 9 have been amended as follows:

6. (Amended) A process according to claim 1 wherein said reductant is selected from the group consisting of ~~cellulose fiber,~~ CDQ dust, pulverized coal, coke breeze, petroleum coke fines, charcoal, graphite, and any other reductant commonly used in the direct reduction of iron ~~blast furnace dust, blast furnace sludge, and mixtures thereof~~.

7. (Amended) A process according to claim 1 wherein the green briquettes ~~agglomerate is~~ are initially heated in an oxidizing atmosphere, followed by further heating in an inert or reducing atmosphere.

8. (Amended) A process according to claim 1, further comprising adding steel alloy materials to the green briquettes ~~agglomerate~~; and introducing said green briquettes

~~agglomerate~~ into a steelmaking furnace.

9. (Amended) A process according to claim 8, wherein ~~said~~ each green briquette ~~agglomerate~~ is has enough reductant for proper reduction of the iron oxide in the ~~formed into a~~ briquette.

Claims 11 - 14 have been amended as follows:

11. (Amended) A process according to claim 1, wherein said green briquette ~~agglomerate~~ is fed directly to the heating furnace without any drying step.

12. (Amended) A process according to claim 1, wherein said cellulose fiber comprises ~~0.5 to 25% of the mixture, where the preferred mixture has~~ 0.5 to 2.0% by weight of each green briquette.

13. (Amended) A process according to claim 1, wherein said metallized briquette ~~agglomerate~~ forms at least 40% metallized iron.

14. (Amended) A process for making strong, green briquettes ~~agglomerates~~ by ~~dry~~ combining iron bearing materials, ~~a~~ reductant, ~~and~~ cellulose fiber and ~~with up to 15%~~ water, wherein the green briquettes ~~agglomerates~~ are formed by high pressure compaction, where the compaction is of sufficient force to squeeze the water to 0% - 5% by weight of the green briquettes.

Claims 17 - 19 have been amended as follows:

17. (Amended) A process according to claim 14, further comprising ~~briquetting said agglomerates, then~~ introducing said green briquettes ~~agglomerates~~ into a steelmaking furnace as iron-bearing feed material.

18. (Amended) A process according to claim 14, wherein from 0.5 to 15 percent of the iron bearing ~~feed~~ material consists of particles that are up to 6 mm in size.

19. (Amended) A process according to claim 14, wherein said cellulose fiber comprises ~~0.5 to 25% of the mixture, where the preferred mixture has~~ 0.5 to 2.0% by weight of each green briquette.

Claim 21 is canceled.